expansion or contraction of the pipe. As shown in Figure 1, the pipe shoe includes a lower curved plate 32 which is affixed to and supported on both the left-side support plate 22 and the right-side support plate 24. Preferably a unitary component including plates 22, 32 and 24 may be formed using conventional manufacturing equipment to achieve the desired shape, then the support plates welded to the base plate 12.

CLEAN VERSION OF CLAIMS:

1. A pipe shoe for supporting a pipe from a pipe rack or other structural support, the pipe shoe comprising:

a generally horizontal base plate for sliding engagement with the pipe rack or other structural support in response to thermal expansion of the pipe;

a left-side support plate and a right-side support plate each affixed to and extending generally upward from the base plate, the right-side support plate including a right-side support plate port;

a curved lower plate affixed to and supported on both the left-side support plate and the right-side support plate, the curved lower plate being configured for supporting the pipe;

a curved upper plate including a left-side lower end and a right-side lower end for positioning about the pipe;

a left-side attachment member for attaching the left-side lower end of the upper plate to the left-side support plate;

an attachment mechanism for securing the right-side lower end of the upper plate to the right-side support plate, the attachment mechanism including a right-side bolt passing through a hole in the right-side lower end of the upper plate and the right-side support plate port, such that the curved upper plate is pulled toward the base plate to place the right-side bolt in tension when the right-side bolt is tightened;

the right-side support plate being angled with respect to a plane perpendicular to a plane of the base plate; and

the right-side support plate being angled away from the centerline of the pipe, such that tightening the right-side bolt pulls the right-side lower end of the upper plate toward a lower portion of the pipe.

7. The pipe shoe as defined in Claim 1, wherein the curved lower plate is configured for planar engagement with the pipe along a circumferential length from 90° to 160°.

11. A pipe shoe for supporting a pipe from a pipe rack or other structural support, the pipe shoe comprising:

a generally horizontal base plate for sliding engagement with the pipe rack or other structural support in response to thermal expansion of the pipe;

a left-side support plate and a right-side support plate each affixed to and extending generally upward from the base plate and angled away from the centerline of the pipe with respect to a plant perpendicular to the base plate, the right-side support plate including a right-side support plate port and the left-side support plate including a left-side support plate port;

a curved lower plate affixed to and supported on both the left-side support plate and the right-side support plate, the curved lower plate being configured for supporting the pipe;

a curved upper plate including a left-side lower end and a right-side lower end for positioning about the pipe;

an attachment mechanism for securing the right-side lower end of the upper plate to the right-side support plate, the attachment mechanism including a right-side bolt passing through a hole in the right-side lower end of the upper plate and the right-side support plate port, such that the curved upper plate is pulled toward the base plate to place the right-side bolt in tension when the right-side bolt is tightened;

the right-side support plate being angled at from 1° to 5° with respect to the plane perpendicular to the base plate, and the left-side support plate being angled at from 1° to 5° with respect to the plane perpendicular to the base plate.

14. The pipe shoe as defined in Claim 11, wherein the curved lower plate is configured for planar engagement with the pipe along a circumferential length from 90° and 160°.

16. A method of supporting a pipe from a pipe rack or other structural support, the method comprising:

providing a generally horizontal base plate for sliding engagement with the pipe rack or other structural support in response to thermal expansion of the pipe;

affixing each of a left-side support plate and a right-side support plate to and extending generally upward from the base plate, the right-side support plate including a right-side support plate port;

affixing a curved lower plate to and supported on both the left-side support plate and the right-side support plate, the curved lower plate being configured for supporting the pipe;

providing a curved upper plate including a left-side lower end and a right-side lower end for positioning about the pipe;

attaching the left-side lower end of the upper plate to the left-side support plate;

securing the right-side lower end of the upper plate to the right-side support plate by inserting a right-side bolt through a hole in the right-side lower end of the upper plate and the right-side support plate port;

tightening the right-side bolt to pull the curved upper plate toward the base plate and place the right-side bolt in both tension and shear;

providing a left-side support plate port, a left-side bolt, and a left-side support plate hole in the left-side lower end of the upper plate; and

the left-side support plate being positioned radially inward of the left-side lower end of the upper plate, and the right-side support plate being positioned radially inward of the right-side lower end of the upper plate.

17. The method as defined in Claim 16, further comprising:

angling the right-side support plate with respect to a plane perpendicular to a plane of the base plate, the right-side support plate being angled away from the centerline of the pipe, such that tightening the right-side bolt pulls the right-side lower end of the upper plate toward a lower portion of the pipe.

20. The method as defined in Claim 16, wherein the curved lower plate is configured for planar engagement with the pipe along a circumferential length of from 90° to 160°.

21. A pipe shoe for supporting a pipe from a pipe rack or other structural support, the pipe shoe comprising:

a generally horizontal base plate for sliding engagement with the pipe rack or other structural support in response to thermal expansion of the pipe;

a left-side support plate and a right-side support plate each affixed to and extending generally upward from the base plate, the right-side support plate including a right-side support plate port;

a curved lower plate affixed to and supported on both the left-side support plate and the right-side support plate, the curved lower plate being configured for supporting the pipe;

a curved upper plate including a left-side lower end and a right-side lower end for positioning about the pipe;

a left-side attachment member for attaching the left-side lower end of the upper plate to the left-side support plate;

an attachment mechanism for securing the right-side lower end of the upper plate to the right-side support plate, the attachment mechanism including a right-side bolt passing through a hole in the right-side lower end of the upper plate and the right-side support plate port, such that the curved upper plate is pulled toward the base plate to place the right-side bolt in tension when the right-side bolt is tightened;

a rear left-side support plate and a rear right-side support plate each affixed to the base plate; and

the curved lower plate extends axially from the front support plates to the rear support plate.

22. The pipe shoe as defined in Claim 21, wherein the right-side support plate is angled at from 1° to 5° with respect to the plane perpendicular to the base plate.

23. The pipe shoe as defined in Claim 21, wherein the left-side support plate is positioned radially inward of the left-side lower end of the upper plate, and the right-side support plate is positioned radially inward of the right-side lower end of the upper plate.

24. The pipe shoe as defined in Claim 21, wherein the curved lower plate is configured for planar engagement with the pipe along a circumferential length of from 90° to 160°.

25. The pipe shoe as defined in Claim 21, wherein each of the curved lower plate and curved upper plate have an arcuate interior surface with a radius substantially conforming to an exterior surface of the pipe.

26. A pipe shoe for supporting a pipe from a pipe rack or other structural support, the pipe shoe comprising:

a generally horizontal base plate for sliding engagement with the pipe rack or other structural support in response to thermal expansion of the pipe;

a left-side support plate and a right-side support plate each affixed to and extending generally upward from the base plate and angled away from the centerline of the pipe with respect to a plant perpendicular to the base plate, the right-side support plate including a right-side support plate port and the left-side support plate including a left-side support plate port;

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a curved lower plate affixed to and supported on both the left-side support plate and the right-side support plate, the curved lower plate being configured for supporting the pipe;

a curved upper plate including a left-side lower end and a right-side lower end for positioning about the pipe;

an attachment mechanism for securing the right-side lower end of the upper plate to the right-side support plate, the attachment mechanism including a right-side bolt passing through a hole in the right-side lower end of the upper plate and the right-side support plate port, such that the curved upper plate is pulled toward the base plate to place the right-side bolt in tension when the right-side bolt is tightened;

a front left-side support plate and a front right-side support plate each secured to the base plate;

a rear left-side support plate and a rear right-side support plate each affixed to the base plate; and

the curved lower plate extends axially from the front support plates to the rear support plate.

27. The pipe shoe as defined in Claim 26, wherein the left-side support plate is positioned radially inward of the left-side lower end of the upper plate, and the right-side support plate is positioned radially inward of the right-side lower end of the upper plate.

28. The pipe shoe as defined in Claim 26, wherein the curved lower plate is configured for planar engagement with the pipe along a circumferential length of from 90° to 160°.

29. A pipe shoe for supporting a pipe from a pipe rack or other structural support, the pipe shoe comprising:

a generally horizontal base plate for sliding engagement with the pipe rack or other structural support in response to expansion of the pipe;

a left-side support plate and a right-side support plate each affixed to and extending generally upward from the base plate, the right-side support plate including a right-side support plate port;

a curved lower plate affixed to and supported on both the left-side support plate and the right-side support plate, the curved lower plate being configured for supporting the pipe;

a curved upper plate including a left-side lower end and a right-side lower end for positioning about the pipe;

a left-side attachment member for attaching the left-side lower end of the upper plate to the left-side support plate;

an attachment mechanism for securing the right-side lower end of the upper plate to the right-side support plate, the attachment mechanism including a right-side bolt passing through a hole in the right-side lower end of the upper plate and the right-side support plate port, at least one of the right-side hole and the right-side port being oversized with respect to the right-side bolt to permit the right-side bolt to pass through the hole and the port, and the curved upper plate is pulled toward the base plate to place the right-side bolt in both tension and shear when the right-side bolt is tightened; and

the right-side support plate being angled away from the centerline of the pipe with respect to a plane perpendicular to a plane of the base plate, such that tightening

the right-side bolt pulls the right-side lower end of the upper plate toward a lower portion of the pipe.

30. The pipe shoe as defined in Claim 29, further comprising:

a left-side support plate port, a left-side bolt, and a left-side support plate hole in the left-side lower end of the upper plate.

31. The pipe shoe as defined in Claim 29, wherein the curved lower plate is configured for planar engagement with the pipe along a circumferential length from 90° to 160°.

32. The pipe shoe as defined in Claim 29, wherein each of the lower plate and curved upper plate have an arcuate interior surface with a radius substantially conforming to an exterior surface of the pipe.

33. A method of supporting a pipe from a pipe rack or other structural support, the method comprising:

providing a generally horizontal base plate for sliding engagement with the pipe rack or other structural support in response to expansion of the pipe;

affixing each of a left-side support plate and a right-side support plate to and extending generally upward from the base plate, the right-side support plate including the right-side support plate port;

affixing a curved lower plate to and supported on both the left-side support plate and the right-side support plate, the curved lower plate being configured for supporting the pipe;

providing a curved upper plate including a left-side lower end and a right-side lower end for positioning about the pipe;

attaching the left-side lower end of the upper plate to the left-side support plate;

securing the right-side lower end of the upper plate to the right-side support plate by inserting a right-side bolt through a hole in the right-side lower end of the upper plate and the right-side support plate port, at least one of the right-side hole and the right-side port being oversized with respect to the right-side bolt; and

tightening the right-side bolt to pull the curved upper plate toward the base plate and place the right-side bolt in both tension and shear.

34. The method as defined in Claim 33, further comprising:

angling the right-side support plate with respect to a plane perpendicular to a plane of the base plate, the right-side support plate being angled away from the centerline of the pipe, such that tightening the right-side bolt pulls the right-side lower end of the upper plate toward a lower portion of the pipe.

35. The method as defined in Claim 33, wherein the curved lower plate is configured for planar engagement with the pipe along a circumferential length [of] from 90° to 160°.